ANTAEUS: SAMPLE RECEIVING LAB/PLANETARY QUARANTINE FACILITY AT THE GATEWAY. M. M. Cohen[1], D. C. Barker[2], N. R. Bennett[3], S. De O. Bianco[1], S. Ge[4], K. Zacny[5]
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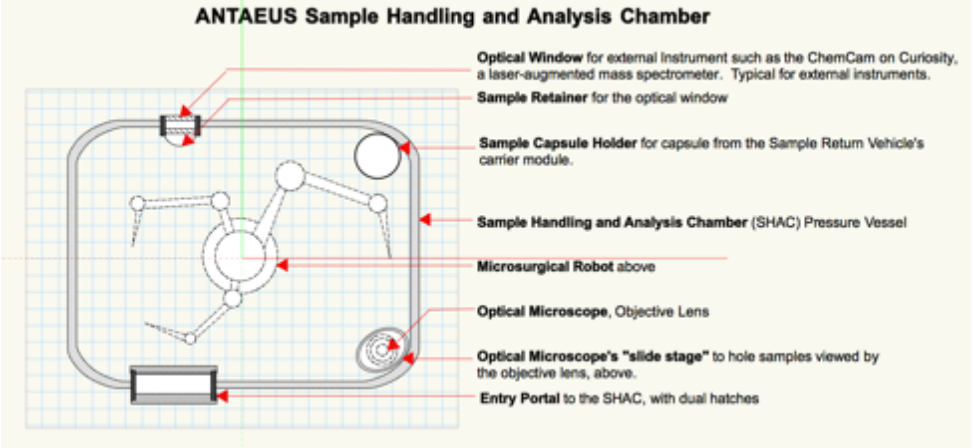

Figure 2. Antaeus Portable Sample Handling Analysis Chamber (SHAC)

Introduction: Antaeus will provide an integrated system to receive samples *from the Moon* and *from Mars* in a module designed to analyze them while maintaining planetary protection against forward and back contamination. In this module, scientists will robotically perform handling, processing, curation, storage, and analysis of samples. The Antaeus module may be attached to the ISS or Gateway to handle *Phase 1* lunar samples, and to the Gateway for *Phase 2* Mars samples.

Antaeus will receive "pristine" samples delivered by robotic spacecraft to its airlock, from which the robotic system will place each sample into an individual sample handling and analysis chamber (SHAC). Researchers may operate the Antaeus systems telerobotically from anywhere. Once the researchers complete their preliminary assessment of lunar samples, they may choose to return a SHAC to Earth or archive it in place.

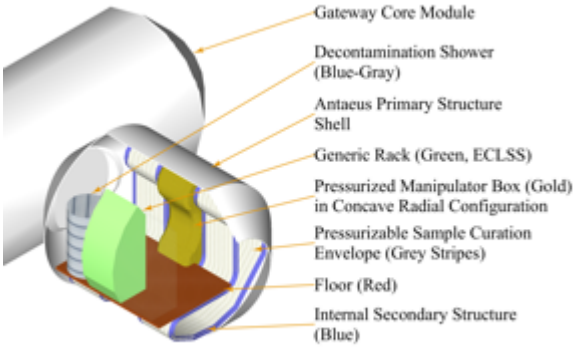

FIGURE 1. Antaeus Module Volumetric Analysis Study

Moon Samples: In addition to a broad range of lunar samples for lunar science and ISRU, samples may include frozen cores from the poles or permanently shadowed craters, kept under cryo-conditions to provide a history of the sun.

Mars Samples: Because of their biological potential, Mars samples may prove far more complex and challenging than lunar samples. For Mars samples, the researchers will determine its biological potential and decide whether to sterilize it or observe it in its "natural" state. The module includes a standalone Environmental Control and Life Support System (ECLSS) including a shower to afford decontamination and bioisolation from the ISS, Gateway Station, or lunar surface base.

Antaeus Mission Development Antaeus fits into multiple mission contexts and frameworks.

Mission Phase 1a addresses lunar robotic exploration and sample return, providing a suite of capabilities to analyze lunar samples in a cryo-vacuum state under laboratory conditions without the necessity of returning them all the way to the Earth.

Mission Phase 1b would support a lunar base or habitat with a surface laboratory. Phase 1 will afford practice and testing for contaminant control and simulated handling of potentially biological samples, such as the Apollo LM Jettison Bags (containing crew biological wastes).

Mission Phase 2a would occur when Antaeus asserts its great advantage at the Gateway for Mars: forward contamination protection of the sample and backward contamination control ***for planetary protection.***

Mission Phase 2b, would integrate an Antaeus module facility with a crewed Mars base or habitat. This unit would help prevent back contamination from Mars to the crew and provide a scientific "front porch" to the Mars base.